



OSGi Alliance Community Event

Remote Management of OSGi Runtimes

Kai Hackbarth, ProSyst Software GmbH



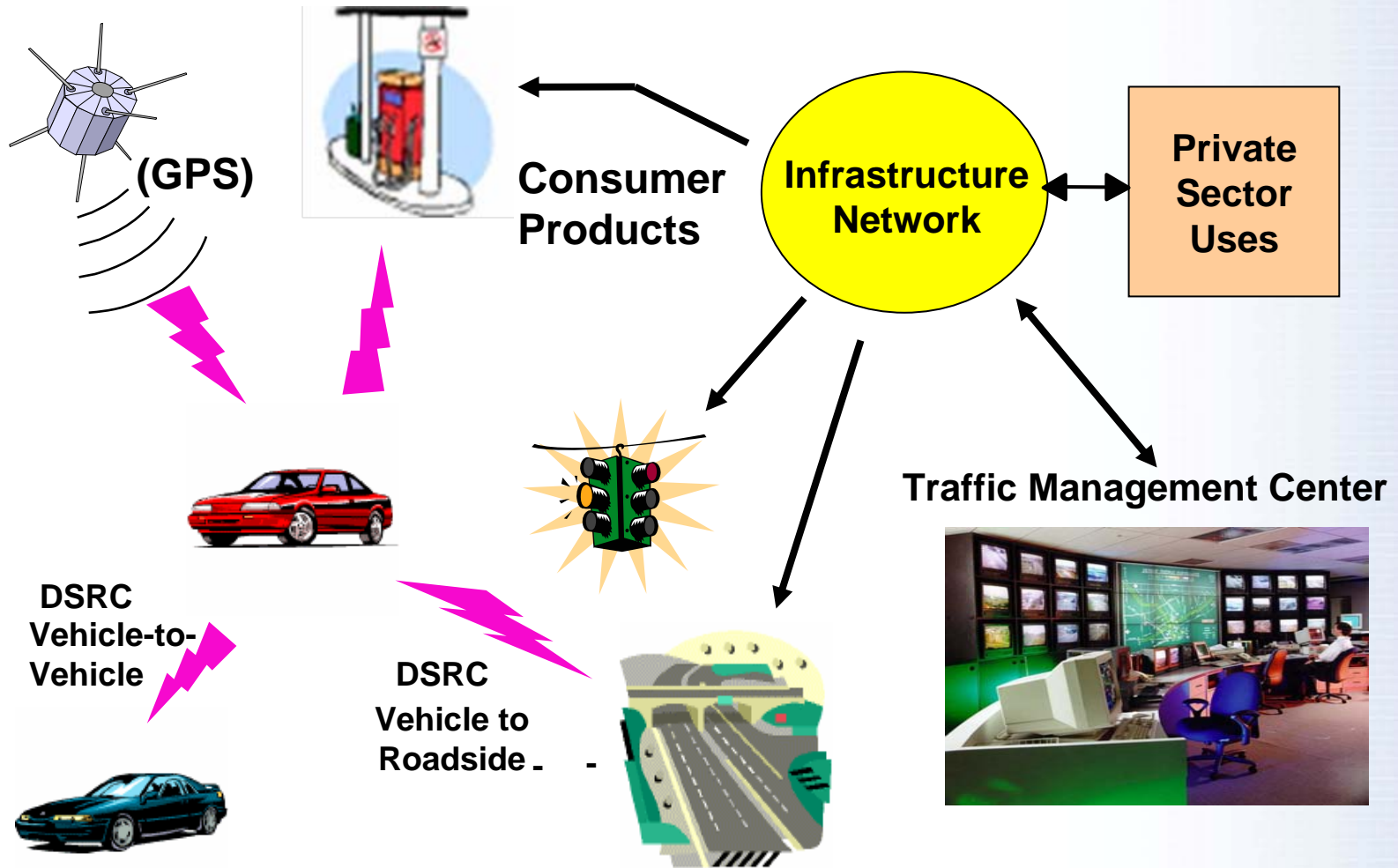
Introduction

- Management for a wide range of network connected devices.
- Support for different management protocols (not only OSGi Gateways)
- Support for multiple software types and distribution formats - OSGi Bundles, OSGi Deployment Packages, MIDlet Suites, Debian Packages, IPKG, software images (zip archives), content files (text, audio, video), Provisioning Archives (JSR-124 PAR format). mPRM can be easily extended by defining additional software/content types



US DOT Vehicle Infrastructure Integration Program

- **Highway Safety**
 - **Cooperative vehicle-roadway effort to mitigate deaths, injuries & property damage**
 - **Primary approach**
 - Intersection cooperation
 - Lane / road departure
 - Vehicle-vehicle cooperation
- **Vehicle Mobility - Improved Traffic Flow**
 - **Cooperative information sharing to improve traffic flow and enhance driving experience**
 - Aggregate real-time probe data into map database
 - Driver advisories, incident detection, optimal signal phasing
 - **City, County and States can track service trucks and emergency vehicles**
- **Consumer and Commercial Services**
 - **Media downloads**
 - **Information services**
 - **Fleet management**
 - **etc.**

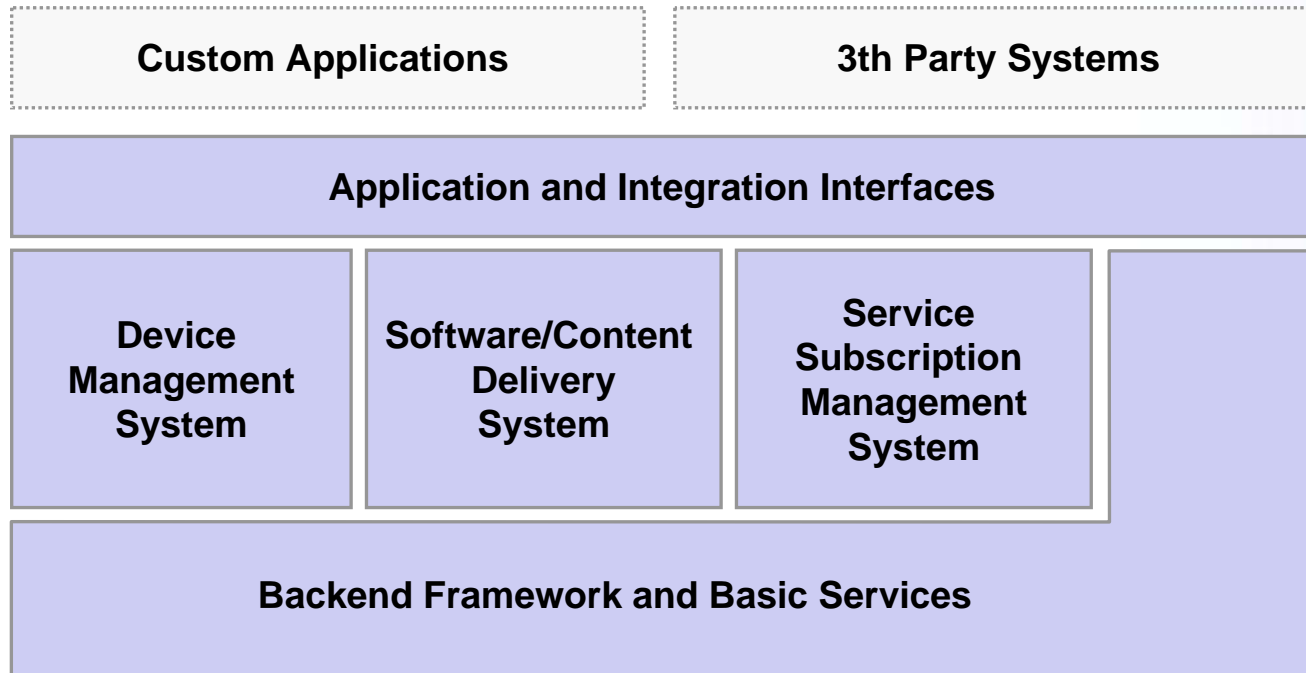




Main functional areas:

- Device Management
- Software/Content Delivery
- Service Subscription Management
- Application Development Services

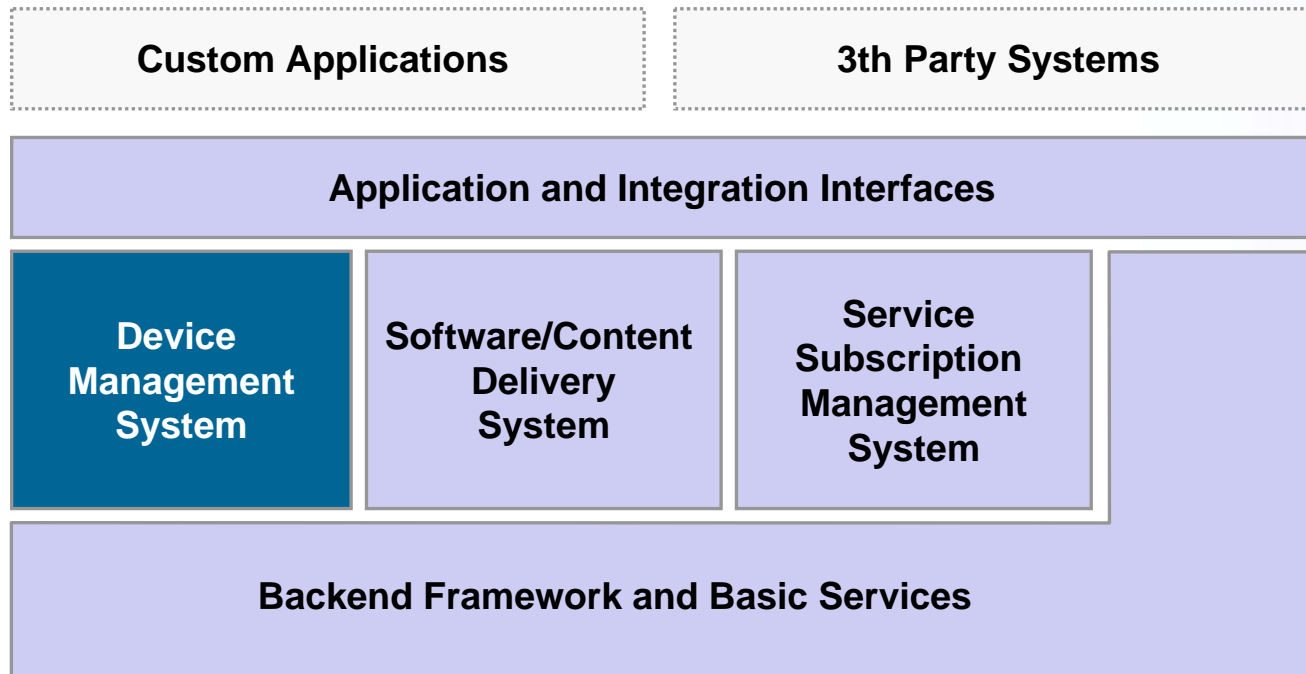
Realized by relatively independent sub-systems, sharing common backend infrastructure





Maintenance and provisioning of wide range of network connected devices:

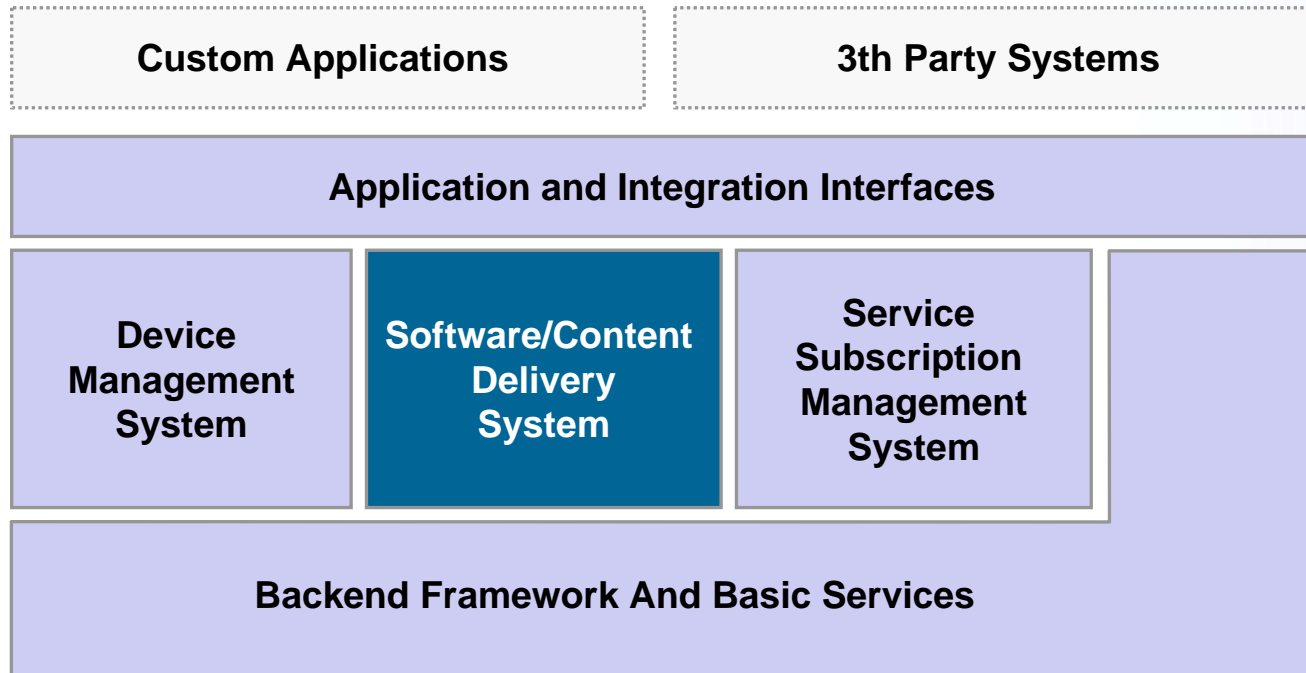
- Device registration and initial provisioning
- Device asset inventory - configuration parameters, software, device capabilities
- Device configuration manipulation - distribution of software, applying configuration and security settings
- Management operation control
- Trouble-shooting and performance monitoring





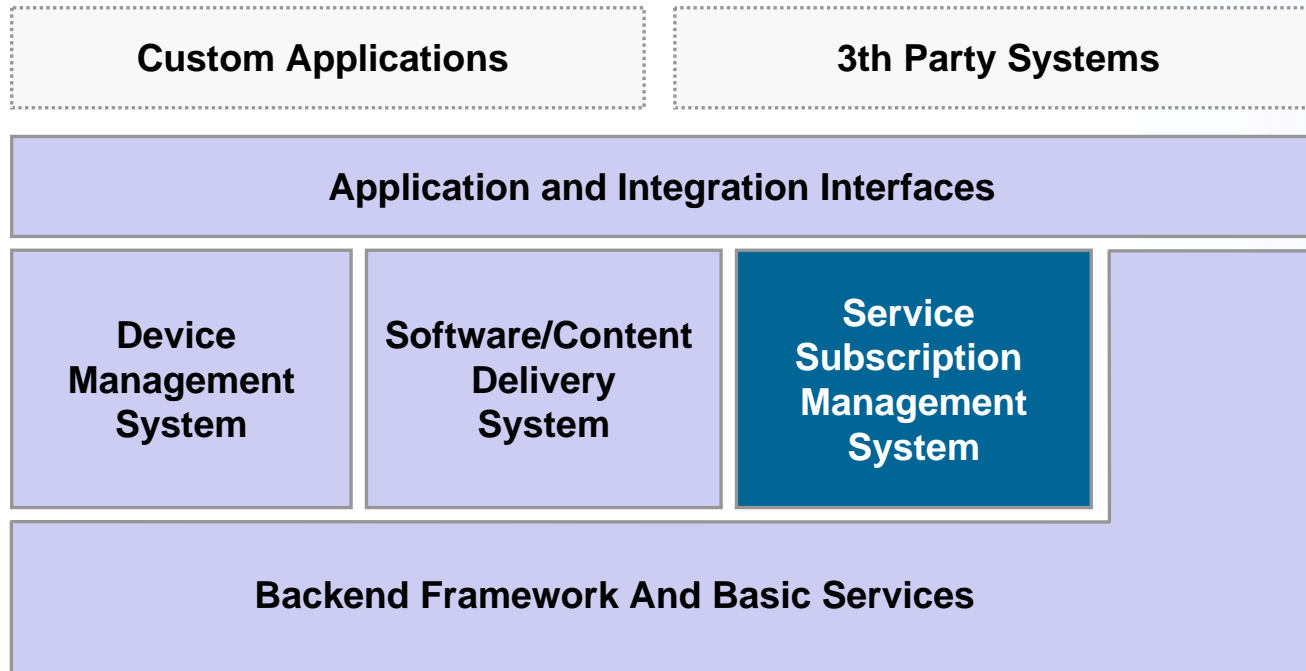
Delivery of applications and content to heterogeneous set of devices

- Support for multiple software types and delivery protocols
- Software Repository - JSR 124 compatible
- Software dependency management
- Software requirements management
- Automated dependency resolving and capability matching





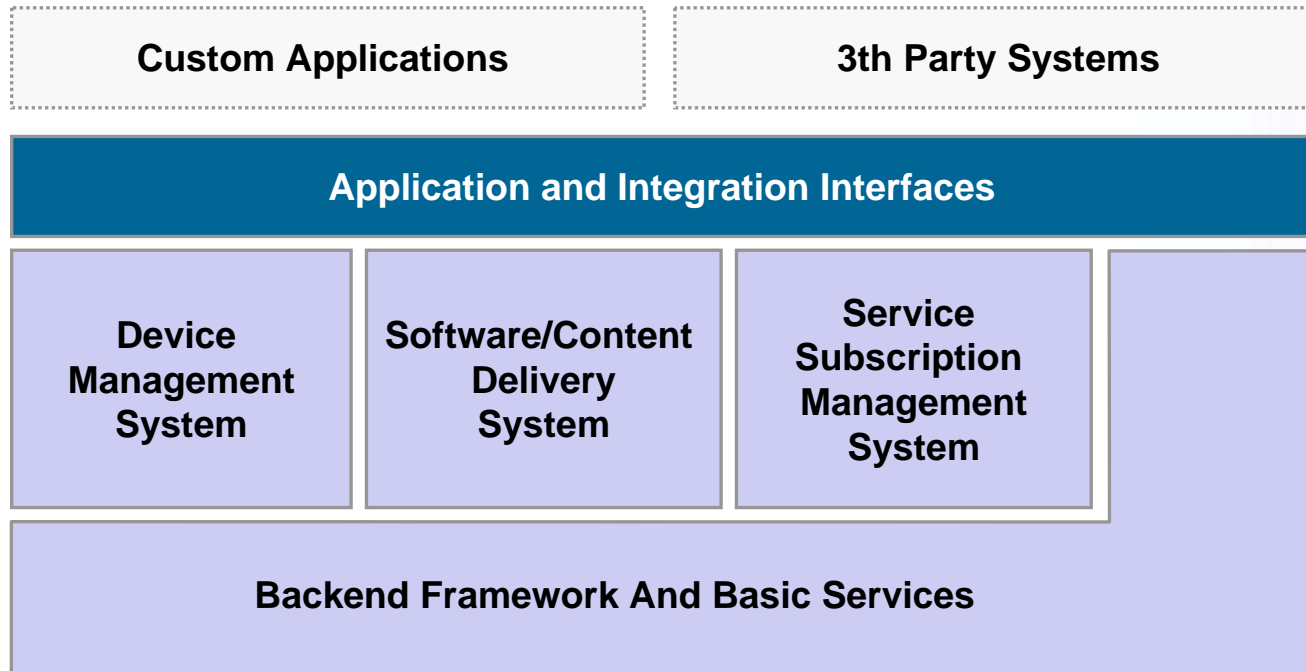
- **User profiles and preferences management**
- **Management of user subscriptions and service delivery**
- **Collecting services usage and billing data**
- **Service discovery and customer self care services and applications**





Services for developing of custom service applications

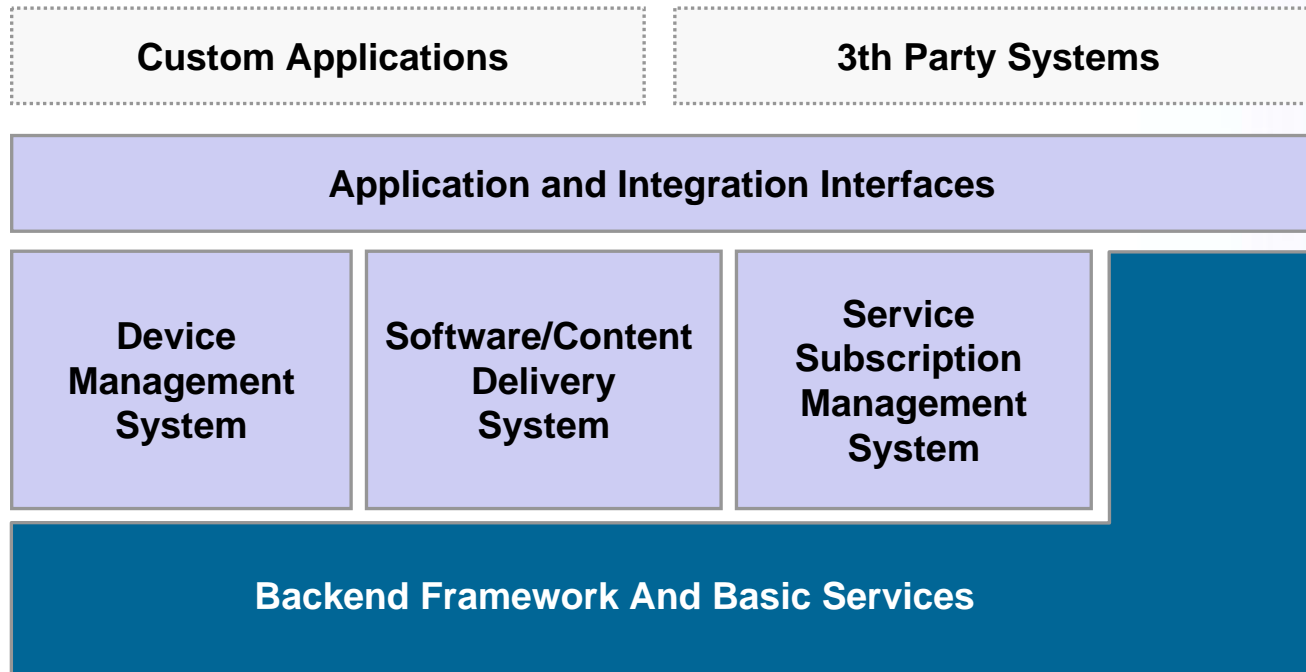
- Rich set of Java APIs
 - Web services API
 - Remote Access Client
 - J2EE JCA API
- Communication Services - JMS, RSI





Common Backend Infrastructure utilizing OSGi framework

- Clustering and System Configuration
- System Monitoring Services - Alert Board, Logging, Performance Statistics
- Communication and Collaboration Services - RPC, Event
- Data Base Access Services - JDBC Connection Management, LDAP Interface
- Security Services - Certificate Mgmt, Network Data Protection, User A&A
- mConsole and Portal Frameworks





Management Operations

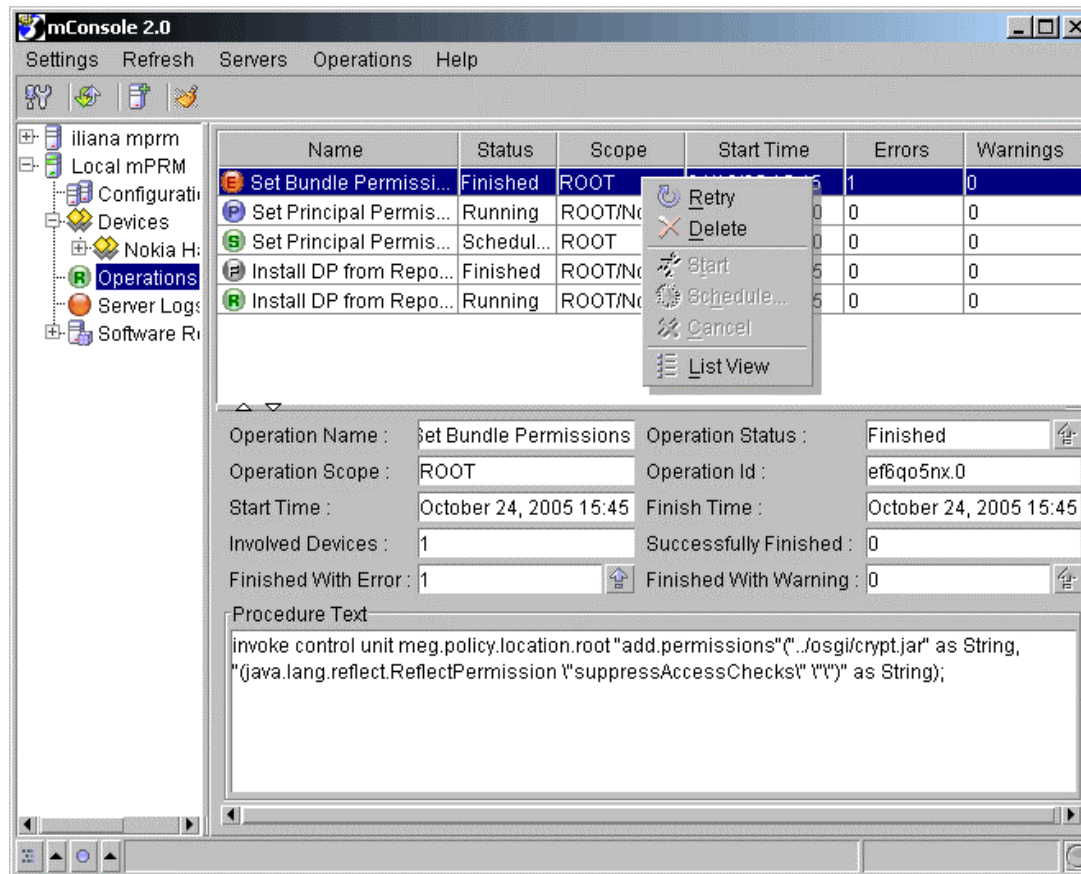
Management operation is a means for executions of a set of commands over single or multiple devices registered in the mPRM system.

Static elements of a Management Operation:

- One or more commands to be executed over the target devices
- Operation target - defines the set of the devices subject of the operation execution:
 - single concrete device
 - all devices in a particular device group (sub-tree of the Device Tree)
 - devices, which full-fill a given criteria (filter)
 - newly registered devices
- Execution time
 - instant execution
 - scheduled for a exact date-time
 - periodic execution - on a time period
 - execution on every device connection
- Dynamic elements for tracking the progress of the command executions



Management Operations with mConsole



The screenshot shows the mConsole 2.0 interface with a table of management operations. A context menu is open over the first row, which is highlighted in blue. The table has columns for Name, Status, Scope, Start Time, Errors, and Warnings. Below the table, there is a detailed view for the selected operation, including fields for Name, Scope, Start Time, and a Procedure Text area.

Name	Status	Scope	Start Time	Errors	Warnings
Set Bundle Permissi...	Finished	ROOT	October 24, 2005 15:45	1	0
Set Principal Permis...	Running	ROOT/N...	October 24, 2005 15:45	0	0
Set Principal Permis...	Schedul...	ROOT	October 24, 2005 15:45	0	0
Install DP from Repo...	Finished	ROOT/N...	October 24, 2005 15:45	0	0
Install DP from Repo...	Running	ROOT/N...	October 24, 2005 15:45	0	0

Operation Name: Set Bundle Permissions
 Operation Status: Finished
 Operation Scope: ROOT
 Operation Id: ef6qo5nx.0
 Start Time: October 24, 2005 15:45
 Finish Time: October 24, 2005 15:45
 Involved Devices: 1
 Successfully Finished: 0
 Finished With Error: 1
 Finished With Warning: 0

Procedure Text
 invoke control unit meg.policy.location.root "add.permissions" ("..osgi/crypt.jar" as String,
 "(java.lang.reflect.ReflectPermission \"suppressAccessChecks\" \"*\")" as String);

- Listing all management operations and their current state
- Filtering and ordering of the operations on various criteria.
- Cancel operations in progress
- Restart operations
- Retry operation over devices finished with errors
- Delete a particular operation
- Delete all successfully finished operations



Management Procedures Script

- A powerful script language for defining complex management operations, which can be executed multiple times.
- Extensible - other mPRM packages and custom modules are able to extend the script definition with custom commands
- Flexible device and component filtering expressions on device root and component control unit state variables, types and ids and hierarchy relations



Software Repository

Software Repository provides unified representation of software resources which can be delivered to different devices supported by the Remote Management (applications, system executable components, content) along with a common way to manage these resources.

Key features of Software Repository:

- Support for multiple software/content types and distribution formats - OSGi Bundles, OSGi Deployment Packages, MIDlet Suites, Debian Packages, IPKG, software images (zip archives), content files (text, audio, video), Provisioning Archives (JSR-124 PAR format). The extensible model allows adding of support for additional software types.
- Common persistent storage for maintaining executable code and content intended for delivery to the devices.
- Software dependency management – automatic and/or manual defining of dependency and compatibility relations between software components and their different versions.



Bundle Requirements & Device Capabilities

- Device capabilities - platform characteristic of the device, which determine what type of software/content can be delivered and run on the device. Include hardware (CPU, RAM and screen resolution) and software platform (OS, JVM and OSGi framework, etc.).
- Bundle requirements - express capabilities which a client bundle needs to be supported by the target devices.
- Device Capabilities and Bundle Requirements are represented as a set of key-value pairs, where keys are strings and values are single string or array of strings.
- Build-in Capability Properties:
 - HardwarePlatform.CPU
 - SoftwarePlatform.OSName
 - SoftwarePlatform.JavaPlatform
 - SoftwarePlatform.OSGi.Specification
 - SoftwarePlatform.OSGi.Framework
 - HardwarePlatform.ScreenSize
- Arbitrary other properties may be used